SEQUENCE LISTING

<110> KANSAS STATE UNIVERSITY RESEARCH FOUNDATION

NAGARAJA, T.

STEWART, GEORGE

NARAYANAN, SANJEEV

CHENGAPPA, M.

<120> RECOMBINANT FUSOBACTERIUM NECROPHORUM LEUKOTOXIN VACCINE AND PREPARATION THEREOF

<130> PCT-30296

<160> 15

<170> PatentIn version 3.0

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Thr Val Arg Ala Asn Asp Thr Ile Thr Ala Thr Glu Asn Phe Gly Thr
        35                  40                  45

Lys Ile Glu Lys Lys Asp Asn Val Tyr Asp Ile Thr Thr Asn Lys Ile
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Gln Gly Glu Asn Ala Phe Asn Ser Phe Asn Arg Phe Ala Leu Thr Glu
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Asn Asn Ile Ala Asn Leu Tyr Phe Gly Glu Lys Asn Ser Thr Gly Val
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Asn Asn Leu Phe Asn Phe Val Asn Gly Lys Ile Glu Val Asp Gly Ile
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Ile Asn Gly Ile Arg Glu Asn Lys Ile Gly Gly Asn Leu Tyr Phe Leu
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Ser Ser Glu Gly Met Ala Val Gly Lys Asn Gly Val Ile Asn Ala Gly
    130   135   140

Ser Phe His Ser Ile Ile Pro Lys Gln Asp Asp Phe Lys Lys Ala Leu
145   150   155   160

Glu Glu Ala Lys His Gly Lys Val Phe Asn Gly Ile Ile Pro Val Asp
                165   170   175

Gly Lys Val Lys Ile Pro Leu Asn Pro Asn Gly Ser Ile Thr Val Glu
            180   185   190

Gly Lys Ile Asn Ala Val Glu Gly Ile Gly Leu Tyr Ala Ala Asp Ile
        195   200   205

Arg Leu Lys Asp Thr Ala Ile Leu Lys Thr Gly Ile Thr Asp Phe Lys
    210   215   220

Asn Leu Val Asn Ile Ser Asp Arg Ile Asn Ser Gly Leu Thr Gly Asp
225   230   235   240

Leu Lys Ala Thr Lys Thr Lys Ser Gly Asp Ile Ile Leu Ser Ala His
            245   250   255

Ile Asp Ser Pro Gln Lys Ala Met Gly Lys Asn Ser Thr Val Gly Lys
        260   265   270

Arg Ile Glu Glu Tyr Val Lys Gly Asn Thr Lys Ala Asn Ile Glu Ser
        275   280   285

Asp Ala Val Leu Glu Ala Asp Gly Asn Ile Lys Ile Ser Ala Lys Ala
    290   295   300

Thr Asn Gly Arg Phe Ile Lys Lys Glu Gly Glu Lys Glu Thr Tyr Asn
305   310   315   320

Thr Pro Leu Ser Leu Ser Asp Val Glu Ala Ser Val Arg Val Asn Lys
            325   330   335

Gly Lys Val Ile Gly Lys Asn Val Asp Ile Thr Ala Glu Ala Lys Asn
        340   345   350

Phe Tyr Asp Ala Thr Leu Val Thr Lys Leu Ala Lys His Ser Phe Ser
        355   360   365

Phe Val Thr Gly Ser Ile Ser Pro Ile Asn Leu Asn Gly Phe Leu Gly
    370   375   380

Leu Leu Thr Ser Lys Ser Ser Val Val Ile Gly Lys Asp Ala Lys Val
385   390   395   400

Glu Ala Thr Glu Gly Lys Ala Asn Ile His Ser Tyr Ser Gly Val Arg
            405   410   415

Ala Thr Met Gly Ala Ala Thr Ser Pro Leu Lys Ile Thr Asn Leu Tyr
        420   425   430

Leu Glu Lys Ala Asn Gly Lys Leu Leu Ser Ile Gly Ala Gly Tyr Ile
    435   440   445

Ser Ala Lys Ser Asn Ser Asn Val Thr Ile Glu Gly Glu Val Lys Ser
    450   455   460

Lys Gly Arg Ala Asp Ile Thr Ser Lys Ser Glu Asn Thr Ile Asp Ala

465   470   475   480

Ser Val Ser Val Gly Thr Met Arg Asp Ser Asn Lys Val Ala Leu Ser
              485   490   495

Val Leu Val Thr Glu Gly Glu Asn Lys Ser Ser Val Lys Ile Ala Lys
              500   505   510

Gly Ala Lys Val Glu Ser Glu Thr Asp Asp Val Asn Val Arg Ser Glu
        515   520   525

Ala Ile Asn Ser Ile Arg Ala Ala Val Lys Gly Gly Leu Gly Asp Ser
        530   535   540

Gly Asn Gly Val Val Ala Ala Asn Ile Ser Asn Tyr Asn Ala Ser Ser
545   550   555   560

Arg Ile Asp Val Asp Gly Tyr Leu His Ala Lys Lys Arg Leu Asn Val
              565   570   575

Glu Ala His Asn Ile Thr Lys Asn Ser Val Leu Gln Thr Gly Ser Asp
              580   585   590

Leu Gly Thr Ser Lys Phe Met Asn Asp His Val Tyr Glu Ser Gly His
              595   600   605

Leu Lys Ser Ile Leu Asp Ala Ile Lys Gln Arg Phe Gly Gly Asp Ser
        610   615   620

Val Asn Glu Glu Ile Lys Asn Lys Leu Thr Asn Leu Phe Ser Val Gly
625   630   635   640

Val Ser Ala Thr Ile Ala Asn His Asn Asn Ser Ala Ser Val Ala Ile
              645   650   655

Gly Glu Ser Gly Arg Leu Ser Ser Gly Val Glu Gly Ser Asn Val Arg
              660   665   670

Ala Leu Asn Glu Ala Gln Asn Leu Arg Ala Thr Thr Ser Ser Gly Ser
        675   680   685

Val Ala Val Arg Lys Glu Glu Lys Lys Lys Leu Ile Gly Asn Ala Ala
        690   695   700

Val Phe Tyr Gly Asn Tyr Lys Asn Asn Ala Ser Val Thr Ile Ala Asp
705   710   715   720

His Ala Glu Leu Val Ser Glu Gly Lys Ile Asp Ile Asn Ser Glu Asn
              725   730   735

Lys Ile Glu Tyr Lys Asn Pro Ser Lys Met Ala Lys Ser Val Ile Asp
              740   745   750

Lys Leu Glu Leu Leu Lys Arg Ala Phe Gly Lys Glu Thr Lys Thr Pro
        755   760   765

Glu Tyr Asp Pro Lys Asp Ile Glu Ser Ile Glu Lys Leu Leu Asn Ala
        770   775   780

Phe Ser Glu Lys Leu Asp Gly Lys Pro Glu Leu Leu Leu Asn Gly Glu
785   790   795   800

Arg Met Thr Ile Ile Leu Pro Asp Gly Thr Ser Lys Thr Gly Thr Ala
              805   810   815

Ile Glu Ile Ala Asn Tyr Val Gln Gly Glu Met Lys Lys Leu Glu Glu
              820   825   830

Page 3

Lys Leu Pro Lys Gly Phe Lys Ala Phe Ser Glu Gly Leu Ser Gly Leu
        835   840   845

Ile Lys Glu Thr Leu Asn Phe Thr Gly Val Gly Asn Tyr Ala Asn Phe
    850   855   860

His Thr Phe Thr Ser Ser Gly Ala Asn Gly Glu Arg Asp Val Ser Ser
865   870   875   880

Val Gly Gly Ala Val Ser Trp Val Glu Gln Glu Asn Tyr Ser Lys Val
            885   890   895

Ser Val Gly Lys Gly Ala Lys Leu Ala Ala Lys Lys Asp Leu Asn Ile
            900   905   910

Lys Ala Ile Asn Lys Ala Glu Thr Val Asn Leu Val Gly Asn Ile Gly
        915   920   925

Leu Ala Arg Ser Ser Thr Ser Gly Ser Ala Val Gly Gly Arg Leu Asn
    930   935   940

Val Gln Arg Ser Lys Asn Ser Ala Ile Val Glu Ala Lys Glu Lys Ala
945   950   955   960

Glu Leu Ser Gly Glu Asn Ile Asn Ala Asp Ala Leu Asn Arg Leu Phe
            965   970   975

His Val Ala Gly Ser Phe Asn Gly Gly Ser Gly Gly Asn Ala Ile Asn
            980   985   990

Gly Met Gly Ser Tyr Ser Gly Gly Ile Ser Lys Ala Arg Val Ser Ile
        995   1000   1005

Asp Asp Glu Ala Tyr Leu Lys Ala Asn Lys Lys Ile Ala Leu Asn
    1010   1015   1020

Ser Lys Asn Asp Thr Ser Val Trp Asn Ala Ala Gly Ser Ala Gly
    1025   1030   1035

Ile Gly Thr Lys Asn Ala Ala Val Gly Val Ala Val Ala Val Asn
    1040   1045   1050

Asp Tyr Asp Ile Ser Asn Lys Ala Ser Ile Glu Asp Asn Asp Glu
    1055   1060   1065

Gly Gln Ser Lys Tyr Asp Lys Asn Lys Asp Asp Glu Val Thr Val
    1070   1075   1080

Thr Ala Glu Ser Leu Glu Val Asp Ala Lys Thr Thr Gly Thr Ile
    1085   1090   1095

Asn Ser Ile Ser Val Ala Gly Gly Ile Asn Lys Val Gly Ser Lys
    1100   1105   1110

Pro Ser Glu Glu Lys Pro Lys Ser Glu Glu Arg Pro Glu Gly Phe
    1115   1120   1125

Phe Gly Lys Ile Gly Asn Lys Val Asp Ser Val Lys Asn Lys Ile
    1130   1135   1140

Thr Asp Ser Met Asp Ser Leu Thr Glu Lys Ile Thr Asn Tyr Ile
    1145   1150   1155

Ser Glu Gly Val Lys Lys Ala Gly Asn Leu Pro Ser Asn Val Ser
    1160   1165   1170

His Thr Pro Asp Lys Gly Pro Ser Phe Ser Leu Gly Ala Ser Gly
    1175   1180   1185

Ser Val Ser Phe Asn Asn Ile Lys Lys Glu Thr Ser Ala Val Val
    1190   1195   1200

Asp Gly Val Lys Ile Asn Leu Lys Gly Ala Asn Lys Lys Val Glu
    1205   1210   1215

Val Thr Ser Ser Asp Ser Thr Phe Val Gly Ala Trp Gly Gly Ser
    1220   1225   1230

Ala Ala Leu Gln Trp Asn His Ile Gly Ser Gly Asn Ser Asn Ile
    1235   1240   1245

Ser Ala Gly Leu Ala Gly Ala Ala Ala Val Asn Asn Ile Gln Ser
    1250   1255   1260

Lys Thr Ser Ala Leu Val Lys Asn Ser Asp Ile Arg Asn Ala Asn
    1265   1270   1275

Lys Phe Lys Val Asn Ala Leu Ser Gly Gly Thr Gln Val Ala Ala
    1280   1285   1290

Gly Ala Gly Leu Glu Ala Val Lys Glu Ser Gly Gly Gln Gly Lys
    1295   1300   1305

Ser Tyr Leu Leu Gly Thr Ser Ala Ser Ile Asn Leu Val Asn Asn
    1310   1315   1320

Glu Val Ser Ala Lys Ser Glu Asn Asn Thr Val Ala Gly Glu Ser
    1325   1330   1335

Glu Ser Gln Lys Met Asp Val Asp Val Thr Ala Tyr Gln Ala Asp
    1340   1345   1350

Thr Gln Val Thr Gly Ala Leu Asn Leu Gln Ala Gly Lys Ser Asn
    1355   1360   1365

Gly Thr Val Gly Ala Thr Val Thr Val Ala Lys Leu Asn Asn Lys
    1370   1375   1380

Val Asn Ala Ser Ile Ser Gly Gly Arg Tyr Thr Asn Val Asn Arg
    1385   1390   1395

Ala Asp Ala Lys Ala Leu Leu Ala Thr Thr Gln Val Thr Ala Ala
    1400   1405   1410

Val Thr Thr Gly Gly Thr Ile Ser Ser Gly Ala Gly Leu Gly Asn
    1415   1420   1425

Tyr Gln Gly Ala Val Ser Val Asn Lys Ile Asp Asn Asp Val Glu
    1430   1435   1440

Ala Ser Val Asp Lys Ser Ser Ile Glu Gly Ala Asn Glu Ile Asn
    1445   1450   1455

Val Ile Ala Lys Asp Val Lys Gly Ser Ser Asp Leu Ala Lys Glu
    1460   1465   1470

Tyr Gln Ala Leu Leu Asn Gly Lys Asp Lys Lys Tyr Leu Glu Asp
    1475   1480   1485

Arg Gly Ile Asn Thr Thr Gly Asn Gly Tyr Tyr Thr Lys Glu Gln
    1490   1495   1500

Leu Glu Lys Ala Lys Lys Lys Glu Gly Ala Val Ile Val Asn Ala
    1505   1510   1515

Ala Leu Ser Val Ala Gly Thr Asp Lys Ser Ala Gly Gly Val Ala

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            1520                    1525                    1530
Ile Ala  Val Asn Thr Val Lys  Asn Lys Phe Lys Ala  Glu Leu Ser
    1535                    1540                    1545

Gly Ser  Asn Lys Glu Ala Gly  Glu Asp Lys Ile His  Ala Lys His
    1550                    1555                    1560

Val Asn  Val Glu Ala Lys Ser  Ser Thr Val Val Val  Asn Ala Ala
    1565                    1570                    1575

Ser Gly  Leu Ala Ile Ser Lys  Asp Ala Phe Ser Gly  Met Gly Ser
    1580                    1585                    1590

Gly Ala  Trp Gln Asp Leu Ser  Asn Asp Thr Ile Ala  Lys Val Asp
    1595                    1600                    1605

Lys Gly  Arg Ile Ser Ala Asp  Ser Leu Asn Val Asn  Ala Asn Asn
    1610                    1615                    1620

Ser Ile  Leu Gly Val Asn Val  Ala Gly Thr Ile Ala  Gly Ser Leu
    1625                    1630                    1635

Ser Thr  Ala Val Gly Ala Ala  Phe Ala Asn Asn Thr  Leu His Asn
    1640                    1645                    1650

Lys Thr  Ser Ala Leu Ile Thr  Gly Thr Lys Val Asn  Pro Phe Ser
    1655                    1660                    1665

Gly Lys  Asn Thr Lys Val Asn  Val Gln Ala Leu Asn  Asp Ser His
    1670                    1675                    1680

Ile Thr  Asn Val Ser Ala Gly  Gly Ala Ala Ser Ile  Lys Gln Ala
    1685                    1690                    1695

Gly Ile  Gly Gly Met Val Ser  Val Asn Arg Gly Ser  Asp Glu Thr
    1700                    1705                    1710

Glu Ala  Leu Val Ser Asp Ser  Glu Phe Glu Gly Val  Ser Ser Phe
    1715                    1720                    1725

Asn Val  Asp Ala Lys Asp Gln  Lys Thr Ile Asn Thr  Ile Ala Gly
    1730                    1735                    1740

Asn Ala  Asn Gly Gly Lys Ala  Ala Gly Val Gly Ala  Thr Val Ala
    1745                    1750                    1755

His Thr  Asn Ile Gly Lys Gln  Ser Val Ile Ala Ile  Val Lys Asn
    1760                    1765                    1770

Ser Lys  Ile Thr Thr Ala Asn  Asp Gln Asp Arg Lys  Asn Ile Asn
    1775                    1780                    1785

Val Thr  Ala Lys Asp Tyr Thr  Met Thr Asn Thr Ile  Ala Val Gly
    1790                    1795                    1800

Val Gly  Gly Ala Lys Gly Ala  Ser Val Gln Gly Ala  Ser Ala Ser
    1805                    1810                    1815

Thr Thr  Leu Asn Lys Thr Val  Ser Ser His Val Asp  Gln Thr Asp
    1820                    1825                    1830

Ile Asp  Lys Asp Leu Glu Glu  Glu Asn Asn Gly Asn  Lys Glu Lys
    1835                    1840                    1845

Ala Asn  Val Asn Val Leu Ala  Glu Asn Thr Ser Gln  Val Val Thr
    1850                    1855                    1860
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Page 6

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Asn Ala  Thr Val Leu Ser Gly  Ala Ser Gly Gln Ala  Ala Val Gly
    1865             1870             1875

Ala Gly  Val Ala Val Asn Lys  Ile Thr Gln Asn Thr  Ser Ala His
    1880             1885             1890

Ile Lys  Asn Ser Thr Gln Asn  Val Arg Asn Ala Leu  Val Lys Ser
    1895             1900             1905

Lys Ser  His Ser Ser Ile Lys  Thr Ile Gly Ile Gly  Ala Gly Val
    1910             1915             1920

Gly Ala  Gly Gly Ala Gly Val  Thr Gly Ser Val Ala  Val Asn Lys
    1925             1930             1935

Ile Val  Asn Asn Thr Ile Ala  Glu Leu Asn His Ala  Lys Ile Thr
    1940             1945             1950

Ala Lys  Gly Asn Val Gly Val  Ile Thr Glu Ser Asp  Ala Val Ile
    1955             1960             1965

Ala Asn  Tyr Ala Gly Thr Val  Ser Gly Val Ala Arg  Ala Ala Ile
    1970             1975             1980

Gly Ala  Ser Thr Ser Val Asn  Glu Ile Thr Gly Ser  Thr Lys Ala
    1985             1990             1995

Tyr Val  Lys Asp Ser Thr Val  Ile Ala Lys Glu Glu  Thr Asp Asp
    2000             2005             2010

Tyr Ile  Thr Thr Gln Gly Gln  Val Asp Lys Val Val  Asp Lys Val
    2015             2020             2025

Phe Lys  Asn Leu Asn Ile Asn  Glu Asp Leu Ser Gln  Lys Arg Lys
    2030             2035             2040

Ile Ser  Asn Lys Lys Gly Phe  Val Thr Asn Ser Ser  Ala Thr His
    2045             2050             2055

Thr Leu  Lys Ser Leu Leu Ala  Asn Ala Ala Gly Ser  Gly Gln Ala
    2060             2065             2070

Gly Val  Ala Gly Thr Val Asn  Ile Asn Lys Val Tyr  Gly Glu Thr
    2075             2080             2085

Glu Ala  Leu Val Glu Asn Ser  Ile Leu Asn Ala Lys  His Tyr Ser
    2090             2095             2100

Val Lys  Ser Gly Asp Tyr Thr  Asn Ser Ile Gly Val  Val Gly Ser
    2105             2110             2115

Val Gly  Val Gly Gly Asn Val  Gly Val Gly Ala Ser  Ser Asp Thr
    2120             2125             2130

Asn Ile  Ile Lys Arg Asn Thr  Lys Thr Arg Val Gly  Lys Thr Thr
    2135             2140             2145

Met Ser  Asp Glu Gly Phe Gly  Glu Glu Ala Glu Ile  Thr Ala Asp
    2150             2155             2160

Ser Lys  Gln Gly Ile Ser Ser  Phe Gly Val Gly Val  Ala Ala Ala
    2165             2170             2175

Gly Val  Gly Ala Gly Val Ala  Gly Thr Val Ser Val  Asn Gln Phe
    2180             2185             2190

Ala Gly  Lys Thr Glu Val Asp  Val Glu Glu Ala Lys  Ile Leu Val
    2195             2200             2205
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Page 7

Lys Lys Ala Glu Ile Thr Ala Lys Arg Tyr Ser Ser Val Ala Ile
   2210   2215   2220

Gly Asn Ala Ala Val Gly Val Ala Ala Lys Gly Ala Gly Ile Gly
   2225   2230   2235

Ala Ala Val Ala Val Thr Lys Asp Glu Ser Asn Thr Arg Ala Arg
   2240   2245   2250

Val Lys Asn Ser Lys Ile Met Thr Arg Asn Lys Leu Asp Val Ile
   2255   2260   2265

Ala Glu Asn Glu Ile Lys Ser Gly Thr Gly Ile Gly Ser Ala Gly
   2270   2275   2280

Ala Gly Ile Leu Ala Ala Gly Val Ser Gly Val Val Ser Val Asn
   2285   2290   2295

Asn Ile Ala Asn Lys Val Glu Thr Asp Ile Asp His Ser Thr Leu
   2300   2305   2310

His Ser Ser Thr Asp Val Asn Val Lys Ala Leu Asn Lys Ile Ser
   2315   2320   2325

Asn Ser Leu Thr Ala Gly Gly Gly Ala Ala Gly Leu Ala Ala Val
   2330   2335   2340

Thr Gly Val Val Ser Val Asn Thr Ile Asn Ser Ser Val Ile Ala
   2345   2350   2355

Arg Val His Asn Asn Ser Asp Leu Thr Ser Val Arg Glu Lys Val
   2360   2365   2370

Asn Val Thr Ala Lys Glu Glu Lys Asn Ile Lys Gln Thr Ala Ala
   2375   2380   2385

Asn Ala Gly Ile Gly Gly Ala Ala Ile Gly Ala Asn Val Leu Val
   2390   2395   2400

Asn Asn Phe Gly Thr Ala Val Glu Asp Arg Lys Asn Ser Glu Gly
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Lys Gly Thr Glu Val Leu Lys Thr Leu Asp Glu Val Asn Lys Glu
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Gln Asp Lys Lys Val Asn Asp Ala Thr Lys Lys Ile Leu Gln Ser
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Ala Gly Ile Ser Thr Glu Asp Thr Ser Val Lys Ala Asp Arg Gly
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Asp Thr Gln Gly Glu Gly Ile Lys Ala Ile Val Lys Thr Ser Asp
   2465   2470   2475

Ile Ile Gly Lys Asn Val Asp Ile Thr Thr Glu Asp Lys Asn Asn
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Ile Thr Ser Thr Gly Gly Leu Gly Thr Ala Gly Leu Ala Ser Ala
   2495   2500   2505

Ser Gly Thr Val Ala Val Thr Asn Ile Lys Arg Asn Ser Gly Val
   2510   2515   2520

Thr Val Glu Asn Ser Phe Val Lys Ala Ala Glu Lys Val Asn Val
   2525   2530   2535

Arg Ser Asp Ile Thr Gly Asn Val Ala Leu Thr Ala Tyr Gln Gly

	2540				2545				2550		

Pro Val Gly Ala Leu Gly Ile Gly Ala Ala Tyr Ala Glu Leu Asn
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Ser Asn Gly Arg Ser Asn Ile Ser Ile Lys Asn Ser Lys Leu Leu
2570 2575 2580

Gly Lys Asn Ile Asp Val Ile Val Lys Asp Lys Ser Glu Leu Arg
2585 2590 2595

Ala Glu Ala Lys Gly Leu Thr Val Gly Ala Val Ala Ala Gly Ala
2600 2605 2610

Ile Ile Ser Lys Ala Lys Asn Glu Met Asn Ser Glu Val Glu Ile
2615 2620 2625

Glu Lys Ser Ile Phe Asn Glu Glu Asn Arg Val Thr Ser Pro Ser
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Lys Gly Ile Gly Arg Glu Ile Asn Val Lys Val Glu Lys Glu Asn
2645 2650 2655

Arg Val Thr Ala Glu Ser Gln Gly Ala Ser Val Gly Ala Val Ala
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Gly Ala Gly Ile Ile Ser Glu Ala Lys Asp Ala Gly Ser Ser Tyr
2675 2680 2685

Leu Lys Val Ser Thr Lys Ser Gly Arg Ser Ile Phe His Ala Asp
2690 2695 2700

Asn Val Asn Met Glu Ala Thr His Lys Met Lys Val Thr Ala Val
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Ser Lys Ala Val Thr Gly Ser Val Leu Gly Gly Val Gly Val Thr
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Lys Ala Glu Ala Thr Ala Ala Gly Lys Thr Met Val Glu Val Glu
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Glu Gly Asn Leu Phe Arg Thr Asn Arg Leu Asn Ala Ile Ser Lys
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Val Glu Gly Leu Asp Glu Asp Lys Val Thr Ala Lys Ser Ser Val
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Val Ser Gly Asn Gly Gly Gly Ile Ala Gly Ala Gly Val Asn Thr
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Ser Thr Ala Gln Ser Asn Thr Glu Ser Val Val Arg Leu Arg Lys
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Gln Asp Tyr Glu Asn Asn Asp Tyr Thr Lys Lys Tyr Ile Ser Glu
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Val Asn Ala Leu Ala Leu Asn Asp Thr Lys Asn Glu Ala Asn Ile
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Glu Ser Leu Ala Val Ala Gly Val His Ala Gln Gly Thr Asn Lys
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Ala Phe Thr Arg Ser Asn Lys Leu Thr Ser Thr Thr Val Asn Gly
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Gly Asn Val Ser Gln Leu Arg Ala Lys Ala Leu Ala Lys Asn Glu
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Asn Tyr Gly Asn Val Lys Gly Thr Gly Gly Ala Leu Val Gly Ala
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Glu Thr Ala Ala Val Glu Asn Tyr Thr Lys Ser Thr Thr Gly Ala
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Leu Val Ala Gly Asn Trp Glu Ile Gly Asp Lys Leu Glu Thr Ile
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Ala Arg Asp Asn Thr Ile Val Arg Val Asn Gly Asp Gly Thr Lys
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Gly Gly Leu Val Gly Lys Asn Gly Ile Ser Val Lys Asn Thr Ile
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Ser Gly Glu Thr Lys Ser Ser Ile Glu Asp Lys Ala Arg Ile Val
    2960   2965   2970

Gly Thr Gly Ser Val Asn Val Asp Ala Leu Asn Glu Leu Asp Val
    2975   2980   2985

Asp Leu Gln Gly Lys Ser Gly Gly Tyr Gly Gly Ile Gly Ile Gly
    2990   2995   3000

Asn Val Asp Val Asn Asn Val Ile Lys Lys Asn Val Glu Ala Lys
    3005   3010   3015

Ile Gly Arg His Ala Ile Val Glu Thr Thr Gly Lys Gln Glu Tyr
    3020   3025   3030

Gln Ala Phe Thr Arg Ala Lys Val Asn Ile Leu Gly Lys Gly Asp
    3035   3040   3045

Ala Ala Ala Ala Ala Ala Ile Ser Asn Val His Ile Ser Asn Glu
    3050   3055   3060

Met Asp Ile Lys Asn Leu Ala Lys Gln Tyr Ala Ser Ser Gln Leu
    3065   3070   3075

Ile Thr Lys Asn Ser Lys Asn Asn Ile Thr Leu Ala Ser Ser Ser
    3080   3085   3090

Glu Ser Asn Val Asn Val His Gly Val Ala Glu Ala Arg Gly Ala
    3095   3100   3105

Gly Ala Lys Ala Thr Val Ser Val Lys Asn Gln Ile Asn Arg Thr
    3110   3115   3120

Asn Asn Val Asp Leu Ala Gly Lys Ile Lys Thr Glu Gly Asn Ile
    3125   3130   3135

Asn Val Tyr Ala Gly Tyr Asp Lys Asn Tyr Asn Ile Ser Lys Thr
    3140   3145   3150

Asn Ser Lys Ala Ile Ala Asp Ala Lys Ser His Ala Ala Ala Ala
    3155   3160   3165

Ser Ala Thr Ala Thr Ile Glu Lys Asn Glu Val Lys Phe Asn Asn
    3170   3175   3180

Ala Ile Arg Glu Phe Lys Asn Asn Leu Ala Arg Leu Glu Gly Lys
    3185   3190   3195

Ala Asn Lys Lys Thr Ser Val Gly Ser Asn Gln Val Asp Trp Tyr
    3200   3205   3210

Thr Asp Lys Tyr Thr Trp His Ser Ser Glu Lys Ala Tyr Lys Lys
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            20                  25                  30

Thr Val Arg Ala Asn Asp Thr Ile Thr Ala Thr Glu Asn Phe Gly Thr
            35                  40                  45

Lys Ile Glu Lys Lys Asp Asn Val Tyr Asp Ile Thr Thr Asn Lys Ile
    50                  55                  60

Gln Gly Glu Asn Ala Phe Asn Ser Phe Asn Arg Phe Ala Leu Thr Glu
65                  70                  75                  80

Asn Asn Ile Ala Asn Leu Tyr Phe Gly Glu Lys Asn Ser Thr Gly Val
                85                  90                  95

Asn Asn Leu Phe Asn Phe Val Asn Gly Lys Ile Glu Val Asp Gly Ile
            100                 105                 110

Ile Asn Gly Ile Arg Glu Asn Lys Ile Gly Gly Asn Leu Tyr Phe Leu
        115                 120                 125

Ser Ser Glu Gly Met Ala Val Gly Lys Asn Gly Val Ile Asn Ala Gly
    130                 135                 140

Ser Phe His Ser Ile Ile Pro Lys Gln Asp Asp Phe Lys Lys Ala Leu
145                 150                 155                 160

Glu Glu Ala Lys His Gly Lys Val Phe Asn Gly Ile Ile Pro Val Asp
                165                 170                 175

Gly Lys Val Lys Ile Pro Leu Asn Pro Asn Gly Ser Ile Thr Val Glu
            180                 185                 190

Gly Lys Ile Asn Ala Val Glu Gly Ile Gly Leu Tyr Ala Ala Asp Ile
        195                 200                 205

Arg Leu Lys Asp Thr Ala Ile Leu Lys Thr Gly Ile Thr Asp Phe Lys
    210                 215                 220

Asn Leu Val Asn Ile Ser Asp Arg Ile Asn Ser Gly Leu Thr Gly Asp
225                 230                 235                 240

Leu Lys Ala Thr Lys Thr Lys Ser Gly Asp Ile Ile Leu Ser Ala His
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Ile Asp Ser Pro Gln Lys Ala Met Gly Lys Asn Ser Thr Val Gly Lys
            260                 265                 270

Arg Ile Glu Glu Tyr Val Lys Gly Asn Thr Lys Ala Asn Ile Glu Ser
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              275                    280         PCT302~1       285
Asp Ala Val Leu Glu Ala Asp Gly Asn Ile Lys Ile Ser Ala Lys Ala
    290                 295                 300

Thr Asn Gly Arg Phe Ile Lys Lys Glu Gly Glu Lys Glu Thr Tyr Asn
305                 310                 315                 320

Thr Pro Leu Ser Leu Ser Asp Val Glu Ala Ser Val Arg Val Asn Lys
                325                 330                 335

Gly Lys Val Ile Gly Lys Asn Val Asp Ile Thr Ala Glu Ala Lys Asn
                340                 345                 350

Phe Tyr Asp Ala Thr Leu Val Thr Lys Leu Ala Lys His Ser Phe Ser
                355                 360                 365

Phe
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Leu Ser Leu Ser Asp Val Glu Ala Ser Val Arg Val Asn Lys Gly Lys
                20                  25                  30

Val Ile Gly Lys Asn Val Asp Ile Thr Ala Glu Ala Lys Asn Phe Tyr
            35                  40                  45

Asp Ala Thr Leu Val Thr Lys Leu Ala Lys His Ser Phe Ser Phe Val
    50                  55                  60

Thr Gly Ser Ile Ser Pro Ile Asn Leu Asn Gly Phe Leu Gly Leu Leu
65                  70                  75                  80

Thr Ser Lys Ser Ser Val Val Ile Gly Lys Asp Ala Lys Val Glu Ala
                85                  90                  95

Thr Glu Gly Lys Ala Asn Ile His Ser Tyr Ser Gly Val Arg Ala Thr
                100                 105                 110

Met Gly Ala Ala Thr Ser Pro Leu Lys Ile Thr Asn Leu Tyr Leu Glu
            115                 120                 125

Lys Ala Asn Gly Lys Leu Leu Ser Ile Gly Ala Gly Tyr Ile Ser Ala
    130                 135                 140

Lys Ser Asn Ser Asn Val Thr Ile Glu Gly Glu Val Lys Ser Lys Gly
145                 150                 155                 160

Arg Ala Asp Ile Thr Ser Lys Ser Glu Asn Thr Ile Asp Ala Ser Val
                165                 170                 175

Ser Val Gly Thr Met Arg Asp Ser Asn Lys Val Ala Leu Ser Val Leu
            180                 185                 190
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Val Thr Glu Gly Glu Asn Lys Ser Ser Val Lys Ile Ala Lys Gly Ala
        195             200         205
Lys Val Glu Ser Glu Thr Asp Asp Val Asn Val Arg Ser Glu Ala Ile
    210             215             220
Asn Ser Ile Arg Ala Ala Val Lys Gly Gly Leu Gly Asp Ser Gly Asn
225             230             235             240
Gly Val Val Ala Ala Asn Ile Ser Asn Tyr Asn Ala Ser Ser Arg Ile
            245             250             255
Asp Val Asp Gly Tyr Leu His Ala Lys Lys Arg Leu Asn Val Glu Ala
            260             265             270
His Asn Ile Thr Lys Asn Ser Val Leu Gln Thr Gly Ser Asp Leu Gly
            275             280             285
Thr Ser Lys Phe Met Asn Asp His Val Tyr Glu Ser Gly His Leu Lys
    290             295             300
Ser Ile Leu Asp Ala Ile Lys Gln Arg Phe Gly Gly Asp Ser Val Asn
305             310             315             320
Glu Glu Ile Lys Asn Lys Leu Thr Asn Leu Phe Ser Val Gly Val Ser
            325             330             335
Ala Thr Ile Ala Asn His Asn Asn Ser Ala Ser Val Ala Ile Gly Glu
            340             345             350
Ser Gly Arg Leu Ser Ser Gly Val Glu Gly Ser Asn Val Arg Ala Leu
        355             360             365
Asn Glu Ala Gln Asn Leu Arg Ala Thr Thr Ser Ser Gly Ser Val Ala
    370             375             380
Val Arg Lys Glu Glu Lys Lys Lys Leu Ile Gly Asn Ala Ala Val Phe
385             390             395             400
Tyr Gly Asn Tyr Lys Asn Asn Ala Ser Val Thr Ile Ala Asp His Ala
            405             410             415
Glu Leu Val Ser Glu Gly Lys Ile Asp Ile Asn Ser Glu Asn Lys Ile
            420             425             430
Glu Tyr Lys Asn Pro Ser Lys Met Ala Lys Ser Val Ile Asp Lys Leu
        435             440             445
Glu Leu Leu Lys Arg Ala Phe Gly Lys Glu Thr Lys Thr Pro Glu Tyr
    450             455             460
Asp Pro Lys Asp Ile Glu Ser Ile Glu Lys Leu Leu Asn Ala Phe Ser
465             470             475             480
Glu Lys Leu Asp Gly Lys Pro Glu Leu Leu Leu Asn Gly Glu Arg Met
            485             490             495
Thr Ile Ile Leu Pro Asp Gly Thr Ser Lys Thr Gly Thr Ala Ile Glu
            500             505             510
Ile Ala Asn Tyr Val Gln Gly Glu Met Lys Lys Leu Glu Glu Lys Leu
            515             520             525
Pro Lys Gly Phe Lys Ala Phe Ser Glu Gly Leu Ser Gly Leu Ile Lys
    530             535             540
Glu Thr Leu Asn Phe Thr Gly Val Gly Asn Tyr Ala Asn Phe His Thr
545             550             555             560
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Gly Ala Val Ser Trp Val Glu Gln Glu Asn Tyr Ser Lys Val Ser Val
        580   585   590

Gly Lys Gly Ala Lys Leu Ala Ala Lys Lys Asp Leu Asn Ile Lys Ala
      595   600   605

Ile Asn Lys Ala Glu Thr Val Asn Leu Val Gly Asn Ile Gly Leu Ala
   610   615   620

Arg Ser Ser Thr Ser Gly Ser Ala Val Gly Gly Arg Leu Asn Val Gln
625   630   635   640

Arg Ser Lys Asn Ser Ala Ile Val Glu Ala Lys Glu Lys Ala Glu Leu
        645   650   655

Ser Gly Glu Asn Ile Asn Ala Asp Ala Leu Asn Arg Leu Phe His Val
        660   665   670

Ala Gly Ser Phe Asn Gly Gly Ser Gly Gly Asn Ala Ile Asn Gly Met
      675   680   685

Gly Ser Tyr Ser Gly Gly Ile Ser Lys Ala Arg Val Ser Ile Asp Asp
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Glu Ala Tyr Leu Lys Ala Asn Lys Lys Ile Ala Leu Asn Ser Lys Asn
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Asp Thr Ser Val Trp Asn Ala Ala Gly Ser Ala Gly Ile Gly Thr Lys
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Asn Ala Ala Val Gly Val Ala Val Ala Val Asn Asp Tyr Asp Ile Ser
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Asn Lys Ala Ser Ile Glu Asp Asn Asp Glu Gly Gln Ser Lys Tyr Asp
        755   760   765

Lys Asn Lys Asp Asp Glu Val Thr Val Thr Ala Glu Ser Leu Glu Val
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Asp Ala Lys Thr Thr Gly Thr Ile Asn Ser Ile Ser Val Ala Gly Gly
785   790   795   800

Ile Asn Lys Val Gly Ser Lys Pro Ser Glu Glu Lys Pro Lys Ser Glu
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Glu Arg Pro Glu Gly Phe Phe Gly Lys Ile Gly Asn Lys Val Asp Ser
        820   825   830

Val Lys Asn Lys Ile Thr Asp Ser Met Asp Ser Leu Thr Glu Lys Ile
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Thr Asn Tyr Ile Ser Glu Gly Val Lys Lys Ala Gly Asn Leu Pro Ser
    850   855   860

Asn Val Ser His Thr Pro Asp Lys Gly Pro Ser Phe Ser Leu Gly Ala
865   870   875   880

Ser Gly Ser Val Ser Phe Asn Asn Ile Lys Lys Glu Thr Ser Ala Val
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        35   40   45

Ser Gly Asn Ser Asn Ser Ala Gly Ala Gly Ala Ala Ala Val Asn Asn
    50   55   60

Ser Lys Thr Ser Ala Val Lys Asn Ser Asp Arg Asn Ala Asn Lys Lys
65   70   75   80

Val Asn Ala Ser Gly Gly Thr Val Ala Ala Gly Ala Gly Ala Val Lys
            85   90   95

Ser Gly Gly Gly Lys Ser Tyr Gly Thr Ser Ala Ser Asn Val Asn Asn
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Val Ser Ala Lys Ser Asn Asn Thr Val Ala Gly Ser Ser Lys Met Asp
        115   120   125

Val Asp Val Thr Ala Tyr Ala Asp Thr Val Thr Gly Ala Asn Ala Gly
    130   135   140

Lys Ser Asn Gly Thr Val Gly Ala Thr Val Thr Val Ala Lys Asn Asn
145   150   155   160

Lys Val Asn Ala Ser Ser Gly Gly Arg Tyr Thr Asn Val Asn Arg Ala
                165   170   175

Asp Ala Lys Ala Ala Thr Thr Val Thr Ala Ala Val Thr Thr Gly Gly
            180   185   190

Thr Ser Ser Gly Ala Gly Gly Asn Tyr Gly Ala Val Ser Val Asn Lys
        195   200   205

Asp Asn Asp Val Ala Ser Val Asp Lys Ser Ser Gly Ala Asn Asn Val
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Ala Lys Asp Val Lys Gly Ser Ser Asp Ala Lys Tyr Ala Asn Gly Lys
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Asp Lys Lys Tyr Asp Arg Gly Asn Thr Thr Gly Asn Gly Tyr Tyr Thr
                245   250   255

Lys Lys Ala Lys Lys Lys Gly Ala Val Val Asn Ala Ala Ser Val Ala
            260   265   270

Gly Thr Asp Lys Ser Ala Gly Gly Val Ala Ala Val Asn Thr Val Lys
        275   280   285

Page 15

Asn Lys Lys Ala Ser Gly Ser Asn Lys Ala Gly Asp Lys His Ala Lys
    290   295   300

His Val Asn Val Ala Lys Ser Ser Thr Val Val Val Asn Ala Ala Ser
305   310   315   320

Gly Ala Ser Lys Asp Ala Ser Gly Met Gly Ser Gly Ala Trp Asp Ser
            325   330   335

Asn Asp Thr Ala Lys Val Asp Lys Gly Arg Ser Ala Asp Ser Asn Val
        340   345   350

Asn Ala Asn Asn Ser Gly Val Asn Val Ala Gly Thr Ala Gly Ser Ser
        355   360   365

Thr Ala Val Gly Ala Ala Ala Asn Asn Thr His Asn Lys Thr Ser Ala
    370   375   380

Thr Gly Thr Lys Val Asn Ser Gly Lys Asn Thr Lys Val Asn Val Ala
385   390   395   400

Asn Asp Ser His Thr Asn Val Ser Ala Gly Gly Ala Ala Ser Lys Ala
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Gly Gly Gly Met Val Ser Val Asn Arg Gly Ser Asp Thr Ala Val Ser
            420   425   430

Asp Ser Gly Val Ser Ser Asn Val Asp Ala Lys Asp Lys Thr Asn Thr
        435   440   445

Ala Gly Asn Ala Asn Gly Gly Lys Ala Ala Gly Val Gly Ala Thr Val
    450   455   460

Ala His Thr Asn Gly Lys Ser Val Ala Val Lys Asn Ser Lys Thr Thr
465   470   475   480

Ala Asn Asp Asp Arg Lys Asn Asn Val Thr Ala Lys Asp Tyr Thr Met
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Thr Asn Thr Ala Val Gly Val Gly Gly Ala Lys Gly Ala Ser Val Gly
            500   505   510

Ala Ser Ala Ser Thr Thr Asn Lys Thr Val Ser Ser His Val Asp Thr
    515   520   525

Asp Asp Lys Asp Asn Asn Gly Asn Lys Lys Ala Asn Val Asn Val Ala
    530   535   540

Asn Thr Ser Val Val Thr Asn Ala Thr Val Ser Gly Ala Ser Gly Ala
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Ala Val Gly Ala Gly Val Ala Val Asn Lys Thr Asn Thr Ser Ala His
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Lys Asn Ser Thr
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<213>   Fusobacterium necrophorum

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Page 16

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            20              25              30

Ser Lys Ser His Ser Ser Ile Lys Thr Ile Gly Ile Gly Ala Gly Val
        35              40              45

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    50              55              60

Val Asn Asn Thr Ile Ala Glu Leu Asn His Ala Lys Ile Thr Ala Lys
65              70              75              80

Gly Asn Val Gly Val Ile Thr Glu Ser Asp Ala Val Ile Ala Asn Tyr
            85              90              95

Ala Gly Thr Val Ser Gly Val Ala Arg Ala Ala Ile Gly Ala Ser Thr
        100             105             110

Ser Val Asn Glu Ile Thr Gly Ser Thr Lys Ala Tyr Val Lys Asp Ser
        115             120             125

Thr Val Ile Ala Lys Glu Glu Thr Asp Asp Tyr Ile Thr Thr Gln Gly
    130             135             140

Gln Val Asp Lys Val Val Asp Lys Val Phe Lys Asn Leu Asn Ile Asn
145             150             155             160

Glu Asp Leu Ser Gln Lys Arg Lys Ile Ser Asn Lys Lys Gly Phe Val
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Thr Asn Ser Ser Ala Thr His Thr Leu Lys Ser Leu Leu Ala Asn Ala
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Ala Gly Ser Gly Gln Ala Gly Val Ala Gly Thr Val Asn Ile Asn Lys
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Val Tyr Gly Glu Thr Glu Ala Leu Val Glu Asn Ser Ile Leu Asn Ala
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Lys His Tyr Ser Val Lys Ser Gly Asp Tyr Thr Asn Ser Ile Gly Val
225             230             235             240

Val Gly Ser Val Gly Val Gly Gly Asn Val Gly Val Gly Ala Ser Ser
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Asp Thr Asn Ile Ile Lys Arg Asn Thr Lys Thr Arg Val Gly Lys Thr
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Thr Met Ser Asp Glu Gly Phe Gly Glu Glu Ala Glu Ile Thr Ala Asp
    275             280             285

Ser Lys Gln Gly Ile Ser Ser Phe Gly Val Gly Val Ala Ala Ala Gly
    290             295             300

Val Gly Ala Gly Val Ala Gly Thr Val Ser Val Asn Gln Phe Ala Gly
305             310             315             320

Lys Thr Glu Val Asp Val Glu Glu Ala Lys Ile Leu Val Lys Lys Ala
            325             330             335

Glu Ile Thr Ala Lys Arg Tyr Ser Ser Val Ala Ile Gly Asn Ala Ala
        340             345             350

Val Gly Val Ala Ala Lys Gly Ala Gly Ile Gly Ala Ala Val Ala Val
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Page 17

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Thr Lys Asp Glu Ser Asn Thr Arg Ala Arg Val Lys Asn Ser Lys Ile
    370                 375                 380
Met Thr Arg Asn Lys Leu Asp Val Ile Ala Glu Asn Glu Ile Lys Ser
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Gly Thr Gly Ile Gly Ser Ala Gly Ala Gly Ile Leu Ala Ala Gly Val
                405                 410                 415
Ser Gly Val Val Ser Val Asn Asn Ile Ala Asn Lys Val Glu Thr Asp
                420                 425                 430
Ile Asp His Ser Thr Leu His Ser Ser Thr Asp Val Asn Val Lys Ala
            435                 440                 445
Leu Asn Lys Ile Ser Asn Ser Leu Thr Ala Gly Gly Gly Ala Ala Gly
    450                 455                 460
Leu Ala Ala Val Thr Gly Val Val Ser Val Asn Thr Ile Asn Ser Ser
465                 470                 475                 480
Val Ile Ala Arg Val His Asn Asn Ser Asp Leu Thr Ser Val Arg Glu
                485                 490                 495
Lys Val Asn Val Thr Ala Lys Glu Glu Lys Asn Ile Lys Gln Thr Ala
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Ala Asn Ala Gly Ile Gly Gly Ala Ala Ile Gly Ala Asn Val Leu Val
            515                 520                 525
Asn Asn Phe Gly Thr Ala Val Glu Asp Arg Lys Asn Ser Glu Gly Lys
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Gly Thr Glu Val Leu Lys Thr Leu Asp Glu Val Asn Lys Glu Gln Asp
545                 550                 555                 560
Lys Lys Val Asn Asp Ala Thr Lys Lys Ile Leu Gln Ser Ala Gly Ile
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Ser Thr Glu Asp Thr Ser Val Lys Ala Asp Arg Gly Asp Thr Gln Gly
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Glu Gly Ile Lys Ala Ile Val Lys Thr Ser Asp Ile Ile Gly Lys Asn
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Gly Thr Ala Gly Leu Ala Ser Ala Ser Gly Thr Val Ala Val Thr Asn
        35   40   45

Ile Lys Arg Asn Ser Gly Val Thr Val Glu Asn Ser Phe Val Lys Ala
    50   55   60

Ala Glu Lys Val Asn Val Arg Ser Asp Ile Thr Gly Asn Val Ala Leu
65   70   75   80

Thr Ala Tyr Gln Gly Pro Val Gly Ala Leu Gly Ile Gly Ala Ala Tyr
            85   90   95

Ala Glu Leu Asn Ser Asn Gly Arg Ser Asn Ile Ser Ile Lys Asn Ser
            100   105   110

Lys Leu Leu Gly Lys Asn Ile Asp Val Ile Val Lys Asp Lys Ser Glu
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Leu Arg Ala Glu Ala Lys Gly Leu Thr Val Gly Ala Val Ala Ala Gly
    130   135   140

Ala Ile Ile Ser Lys Ala Lys Asn Glu Met Asn Ser Glu Val Glu Ile
145   150   155   160

Glu Lys Ser Ile Phe Asn Glu Glu Asn Arg Val Thr Ser Pro Ser Lys
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Gly Ile Gly Arg Glu Ile Asn Val Lys Val Glu Lys Glu Asn Arg Val
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Thr Ala Glu Ser Gln Gly Ala Ser Val Gly Ala Val Ala Gly Ala Gly
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Ile Ile Ser Glu Ala Lys Asp Ala Gly Ser Ser Tyr Leu Lys Val Ser
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Thr Lys Ser Gly Arg Ser Ile Phe His Ala Asp Asn Val Asn Met Glu
225   230   235   240

Ala Thr His Lys Met Lys Val Thr Ala Val Ser Lys Ala Val Thr Gly
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Ser Val Leu Gly Gly Val Gly Val Thr Lys Ala Glu Ala Thr Ala Ala
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Gly Lys Thr Met Val Glu Val Glu Glu Gly Asn Leu Phe Arg Thr Asn
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Arg Leu Asn Ala Ile Ser Lys Val Glu Gly Leu Asp Glu Asp Lys Val
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305   310   315   320

Ala Gly Val Asn Thr Ser Thr Ala Gln Ser Asn Thr Glu Ser Val Val
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Arg Leu Arg Lys Gln Asp Tyr Glu Asn Asn Asp Tyr Thr Lys Lys Tyr
        340   345   350

Ile Ser Glu Val Asn Ala Leu Ala Leu Asn Asp Thr Lys Asn Glu Ala
        355   360   365

Asn Ile Glu Ser Leu Ala Val Ala Gly Val His Ala Gln Gly Thr Asn
    370   375   380

Page 19

Lys Ala Phe Thr Arg Ser Asn Lys Leu Thr Ser Thr Thr Val Asn Gly
385   390   395   400

Gly Asn Val Ser Gln Leu Arg Ala Lys Ala Leu Ala Lys Asn Glu Asn
            405   410   415

Tyr Gly Asn Val Lys Gly Thr Gly Gly Ala Leu Val Gly Ala Glu Thr
            420   425   430

Ala Ala Val Glu Asn Tyr Thr Lys Ser Thr Thr Gly Ala Leu Val Ala
        435   440   445

Gly Asn Trp Glu Ile Gly Asp Lys Leu Glu Thr Ile Ala Arg Asp Asn
    450   455   460

Thr Ile Val Arg Val Asn Gly Asp Gly Thr Lys Gly Gly Leu Val Gly
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Lys Asn Gly Ile Ser Val Lys Asn Thr Ile Ser Gly Glu Thr Lys Ser
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Ser Ile Glu Asp Lys Ala Arg Ile Val Gly Thr Gly Ser Val Asn Val
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Asp Ala Leu Asn Glu Leu Asp Val Asp Leu Gln Gly Lys Ser Gly Gly
        515   520   525

Tyr Gly Gly Ile Gly Ile Gly Asn Val Asp Val Asn Asn Val Ile Lys
    530   535   540

Lys Asn Val Glu Ala Lys Ile Gly Arg His Ala Ile Val Glu Thr Thr
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Gly Lys Gln Glu Tyr Gln Ala Phe Thr Arg Ala Lys Val Asn Ile Leu
            565   570   575

Gly Lys Gly Asp Ala Ala Ala Ala Ala Ile Ser Asn Val His Ile
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Ser Asn Glu Met Asp Ile Lys Asn Leu Ala Lys Gln Tyr Ala Ser Ser
    595   600   605

Gln Leu Ile Thr Lys Asn Ser Lys Asn Asn Ile Thr Leu Ala Ser Ser
    610   615   620

Ser Glu Ser Asn Val Asn Val His Gly Val Ala Glu Ala Arg Gly Ala
625   630   635   640

Gly Ala Lys Ala Thr Val Ser Val Lys Asn Gln Ile Asn Arg Thr Asn
            645   650   655

Asn Val Asp Leu Ala Gly Lys Ile Lys Thr Glu Gly Asn Ile Asn Val
        660   665   670

Tyr Ala Gly Tyr Asp Lys Asn Tyr Asn Ile Ser Lys Thr Asn Ser Lys
    675   680   685

Ala Ile Ala Asp Ala Lys Ser His Ala Ala Ala Ser Ala Thr Ala
    690   695   700

Thr Ile Glu Lys Asn Glu Val Lys Phe Asn Asn Ala Ile Arg Glu Phe
705   710   715   720

Lys Asn Asn Leu Ala Arg Leu Glu Gly Lys Ala Asn Lys Lys Thr Ser
            725   730   735

Val Gly Ser Asn Gln Val Asp Trp Tyr Thr Asp Lys Tyr Thr Trp His

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Glu Lys Gly Lys Lys
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Leu Gly Gln Lys Asn Thr Gly Glu Leu Arg Trp Gly Leu Asn Tyr Ile
        35   40   45

Asn Asn Ser Val Thr Gly Asn Arg Asp Gln Leu Ser Leu Thr Ser Leu
    50   55   60

Val Thr Glu Gly Thr Ala Ser Leu Ser Ser Phe Tyr Thr Phe Pro Val
65   70   75   80

Ser Lys Lys Gly Thr Lys Ile Ser Leu Gln His Ser Val Gly Lys Leu
                85   90   95

Lys His Ile Gln Gly Ala Leu Lys His Lys Ile Thr Gly Asn Ser Tyr
            100   105   110

Ser Tyr Gly Val Gly Ile Val His Pro Ile Leu Val His Glu Lys Asn
            115   120   125

Lys Val Glu Leu Ser Leu Asp Trp Val Lys Gln Arg Thr Val Thr Asp
    130   135   140

Leu Leu Lys Leu Lys Trp Val Asn Asn Arg Leu Ser Lys Tyr Thr Ala
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Gly Ile Gly Ile Ser His Tyr Glu Glu Asp Ser Val Phe Tyr Thr Lys
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Gln Asn Ile Thr Lys Gly Lys Phe Ile Pro Ile Ser Gly Asp Ala Arg
            180   185   190

Asn Tyr Thr Lys Tyr Asp Met Phe Leu Ile Tyr Gln Lys Asn Leu Lys
            195   200   205

Tyr Asn Thr Leu Val Thr Leu Lys Met Ala Gly Gln Tyr Ser Leu Ser
    210   215   220

Lys Lys Leu Pro Ser Val Glu Gln Ile Tyr Ala Gly Gly Ala Tyr Asn
225   230   235   240

Val Arg Gly Tyr Pro Glu Asn Phe Met Gly Ala Glu His Gly Val Phe
                245   250   255

Phe Asn Ala Glu Leu Ser Lys Leu Val Glu Asn Lys Gly Glu Phe Phe
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Val Phe Leu Asp Gly Ala Ser Leu His Gly Glu Ser Ala Trp Gln Glu
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Asn Arg Ile Phe Ser Ser Gly Phe Gly Tyr Lys Ile Arg Phe Leu Glu
          290   295   300

Lys Asn Asn Ile Ala Val Ser Met Ala Phe Pro Trp Lys Lys Lys Ile
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Page 24

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<211> 2780

<212> DNA

<213> Fusobacterium necrophorum

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<212> DNA

<213> Fusobacterium necrophorum

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<213> Fusobacterium necrophorum

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Page 38

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